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NOTES ON *CALLIANASSA* (CRUSTACEA: THALASSINIDEA) IN WESTERN PORT, VICTORIA

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Abstract: Populations of *Callianassa arenosa* Poore and *C. australiensis* (Dana) which co-occur in Western Port, Victoria, were sampled at monthly intervals over a period of one year. At the beginning (March 1976) and end (March 1977) of the study period *C. arenosa* was more abundant than *C. australiensis*, but in the middle *C. australiensis* was more abundant. *C. australiensis*, the larger species, provided the greater population biomass during most of the year. Both species showed a major peak in reproductive activity in spring. Only *C. arenosa* showed a marked summer peak in reproduction.

INTRODUCTION

Callianassa arenosa Poore and *C. australiensis* (Dana) are abundant in intertidal and shallow subtidal, sandy sediments of Western Port, Victoria 145°20'E, 38°20'S) (Coleman & Poore 1980. Hailstone & Stephenson (1961) described in detail the biology of *C. australiensis* from Queensland populations, but for Western Port populations information is more limited. Robertson (1977) showed the species to be important in the diet of the King George whiting, and briefly described reproductive patterns. Data for *C. arenosa* are restricted to brief descriptions of its abundance and sediment preferences in Port Phillip (Poore 1975) and Western Port (Coleman & Poore 1980).

To provide more specific information on the abundance, biomass and biology of *Callianassa* in Western Port, populations were sampled during 1976 and 1977.

MATERIALS AND METHODS

Samples were taken monthly from March 1976 to March 1977 at a site in the north of Western Port where *C. arenosa* and *C. australiensis* co-occur (Fig. 1). Every month 24 samples, each consisting of sediment excavated to a depth of about 40 cm from within a 0.05 m² sampling frame, were taken. The samples were washed through a 2 mm mesh. *Callianassa* specimens were removed, kept in sea water for 24 hours and then frozen. The residue from sieving was preserved with 5% neutral formalin.

In the laboratory the *Callianassa* were identified into species, sexed, examined for eggs, measured along the length of the carapace and weighed. Sieve residues were sorted and *Callianassa* specimens found were treated as above except that dry weights were estimated from length-weight relationships of the unpreserved, freshly killed specimens.

RESULTS

The relative abundances of the species changed considerably during the study period (Fig. 2). The population density of *C. arenosa* ranged from 25 to 109 per m² and this species was numerically dominant during March to May 1976, and during February and March 1977. The density of *C. australiensis* ranged from 11 to 303 per m² and this species was numerically dominant from June 1976 to January 1977. For most of the year *C. australiensis*, the larger species, provided the greater biomass (Fig. 2).

With *C. arenosa*, peaks of reproductive activity (as indicated by the proportion of ovigerous females) occurred during spring and summer (Fig. 3). The minimum carapace length at which ovigerous females were found was 4-5 mm. During spring only a small proportion of this size group was ovigerous but the majority were ovigerous during the summer.

Fluctuations in population density and biomass were correlated with reproductive activity. Peaks in biomass occurred when the proportion of

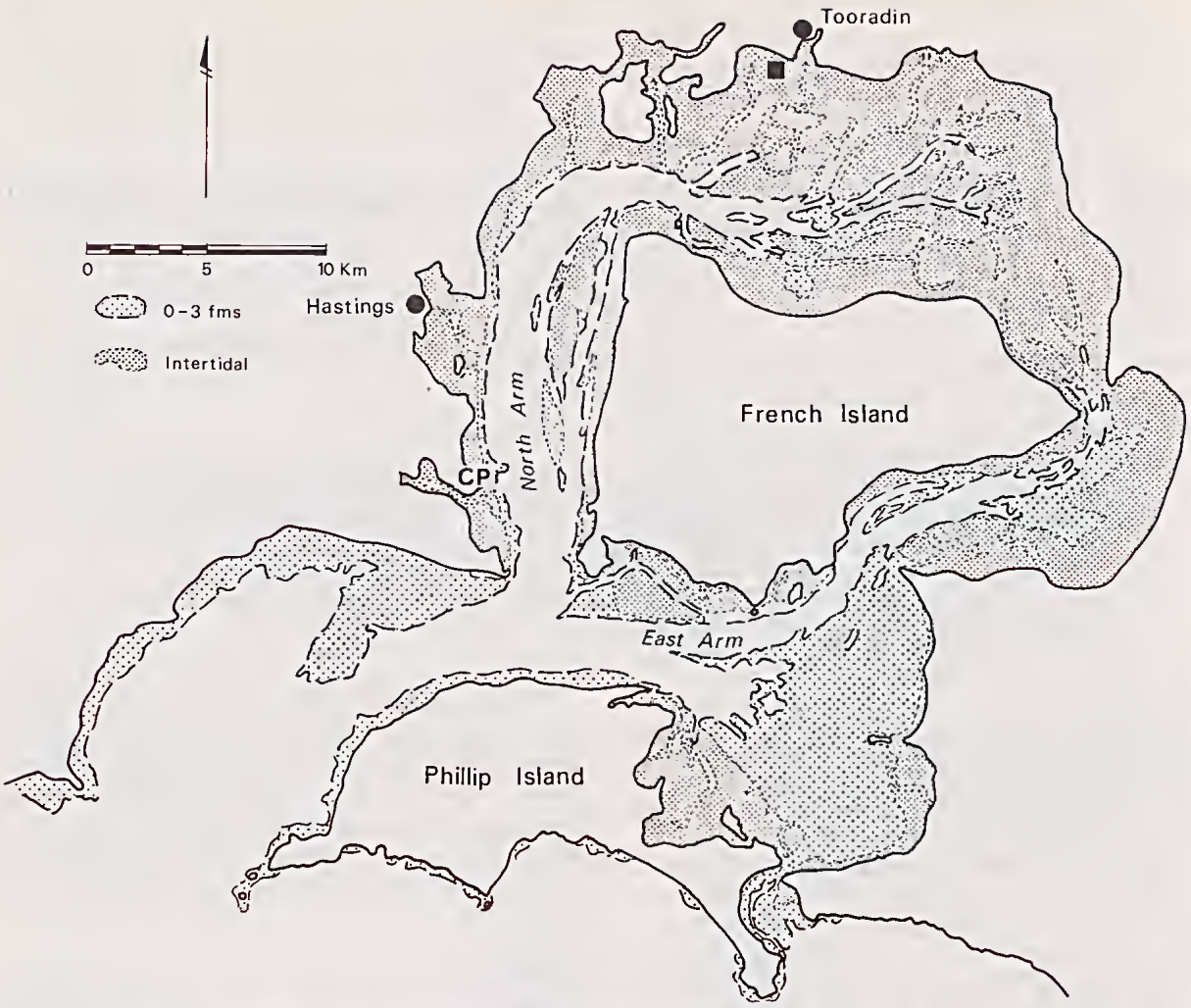

FIG. 1.—Map of Western Port (145°20'E 38°20'S) showing sampling site of *Callianassa* (■). CP = Crib Point.

ovigerous females was greatest. Peaks in density, in October 1976 and during February and March 1977, shortly followed the appearance of ovigerous females, and samples in these months had a high proportion of small individuals (Fig. 4). The high proportion of small individuals in April and May 1976 is presumably from the summer spawning of 1975-76.

In *C. australiensis*, there was marked reproductive activity in September 1976, but only a very minor resurgence of reproduction in December 1976 (Fig. 3). Changes in population density and biomass were much more marked than for *C. arenosa* but were not clearly correlated with reproduction. At no time were small individuals dominant in the population. The great increase in abundance and biomass during October-December 1976, although following the period of maximum reproductive activity, was due mainly to an increase in large, non-reproductive individuals. A minor peak in June had a similar cause (Fig. 5).

For both species, size frequency histograms gave no clear indication of year groups or of progression of modes that could be used to calculate growth rates. For *C. australiensis*, there was some indication of two size classes, indicative of two year groups, during October to December 1976, but for *C. arenosa* there was no indication of more than one size class at any time.

DISCUSSION

The life history of *C. arenosa* has not previously been studied, but the present work shows it to be similar to that of other species of *Callianassa*.

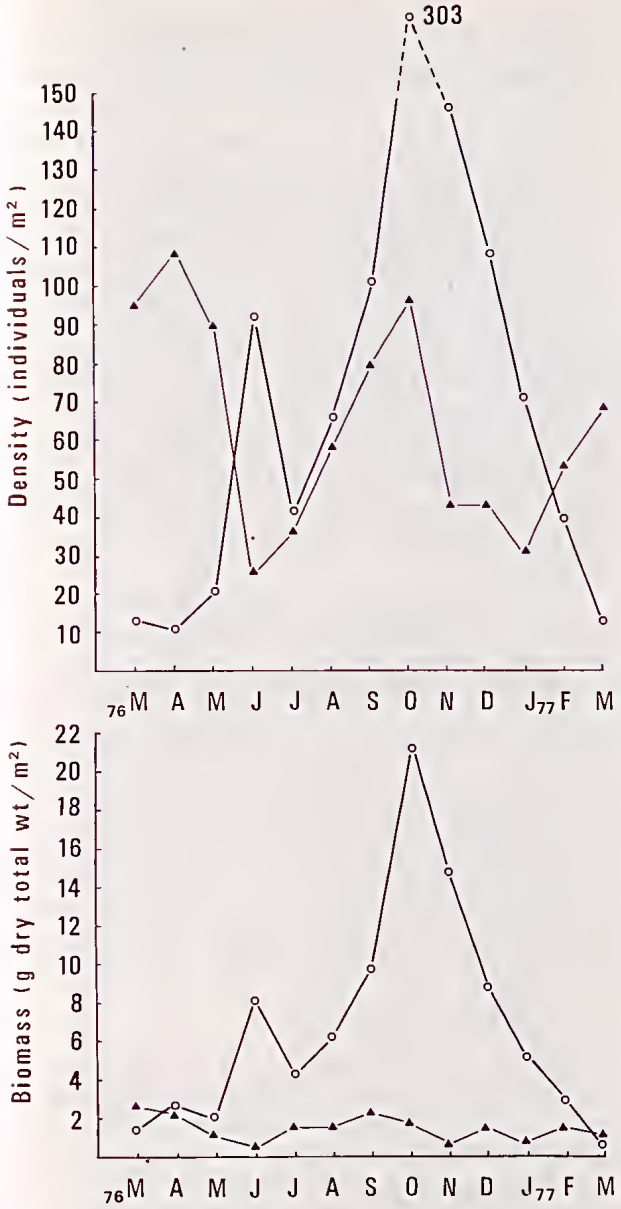

FIG. 2.—Monthly density and biomass for *Callianassa arenosa* (▲) and *C. australiensis* (○) from March 1976 to March 1977.

Monthly population densities were within values recorded for other species of *Callianassa* (Pohl 1946, Hailstone & Stephenson 1961, Poore 1975). The lack of progression of modes in size-frequency histograms has been previously reported for *C. australiensis*, and has been taken to indicate small-scale migration in and out of the population (Hailstone & Stephenson 1961). An extended reproductive period with one or two peaks of activity has been reported for the American *C. californiensis* (MacGinitie 1934), for *C. australiensis* in Queensland (Hailstone & Stephenson 1961) and Victoria (Robertson 1977), and for the New Zealand *C. filholi* (Devine 1966).

The proportion of large ovigerous *C. arenosa* was similar in spring and summer, but only a few of the smallest individuals capable of reproduction were ovigerous in spring. Perhaps for small individuals at this time somatic growth is more important than the production of gametes and takes place at the expense of the latter. A similar situa-

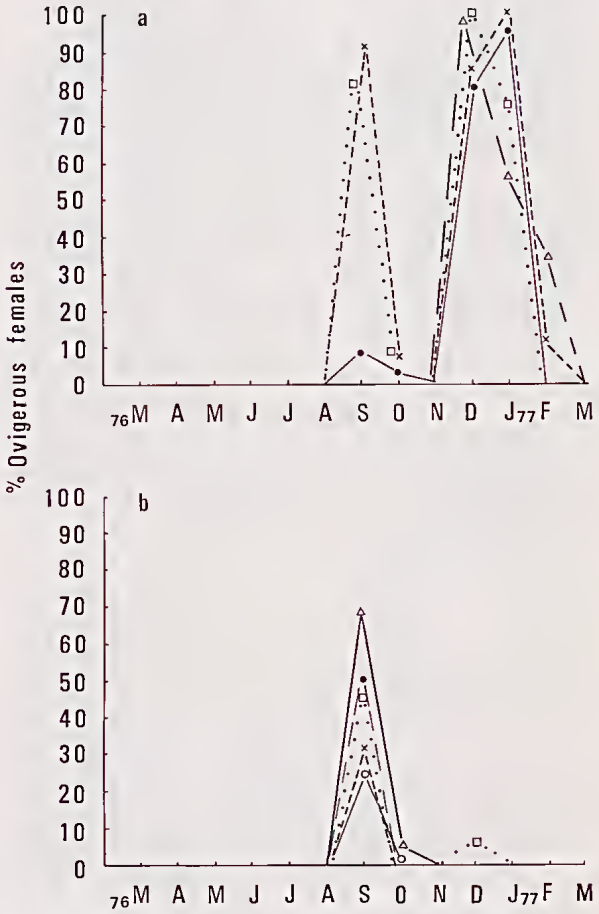

FIG. 3.—Ovigerous females in monthly samples of *Callianassa* from March 1976 to March 1977.

a. *C. arenosa*
- 4-5 mm carapace length;
- 5-6 mm carapace length;
- 6-7 mm carapace length;
- 7-8 mm carapace length.

b. *C. australiensis*
- 5-6 mm carapace length;
- 6-7 mm carapace length;
- 7-8 mm carapace length;
- 8-9 mm carapace length;
- 9-10 mm carapace length.

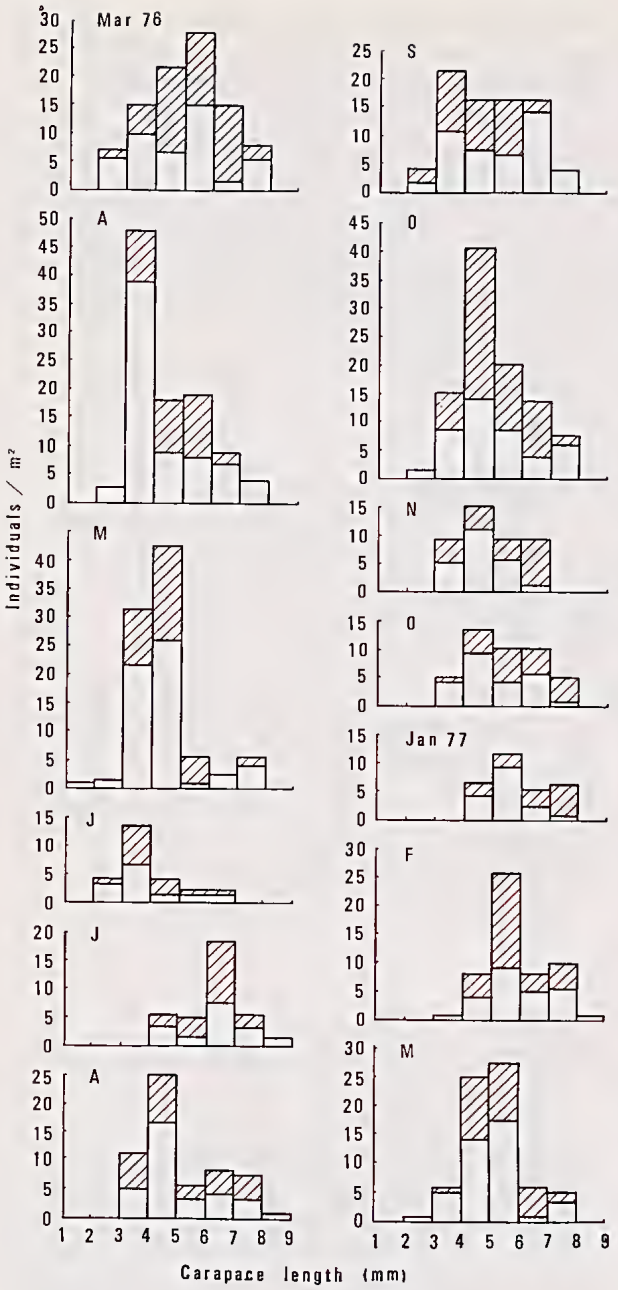

FIG. 4.— Size frequency histograms for *Callianassa arenosa* collected monthly from March 1976 to March 1977. Bar height indicates total individuals/m²; cross hatching indicates the number of females and the clear area number of males.

tion has been described for the terrestrial isopod *Armadillium vulgare*: small individuals produce one brood a year, large individuals two (Lawlor 1976).

For *C. australiensis*, the findings of this work are similar to those of other reports (Hailstone & Stephenson 1961; Robertson 1977) but differ in some details. Hailstone & Stephenson (1961) found the major breeding season of Queensland populations to be in autumn and the minimum size of spawning to be at carapace length 8-9 mm. The present work found most reproduction in spring and the minimum size for reproduction at 5-6 mm carapace length. In the present study, few ovigerous females were found after September although Robertson (1977) found that at Crib Point, 20 km south-west of the present study area, the major period of reproduction was October to December.

The virtual absence from the samples of reproductive individuals during the period October to January, although individuals elsewhere in the bay may be reproductive at this time, plus the appearance and disappearance of large non-reproductive individuals during these months, suggests the migration of *C. australiensis* through the study area. Migration was not directly observed, but has been reported for *C. turnerana* in the Cameroons (Monod 1927; *fide* Hailstone & Stephenson 1961), and for a number of other decapod species (Chittleborough 1970, Atkinson & Parsons 1973, Boddeke 1976).

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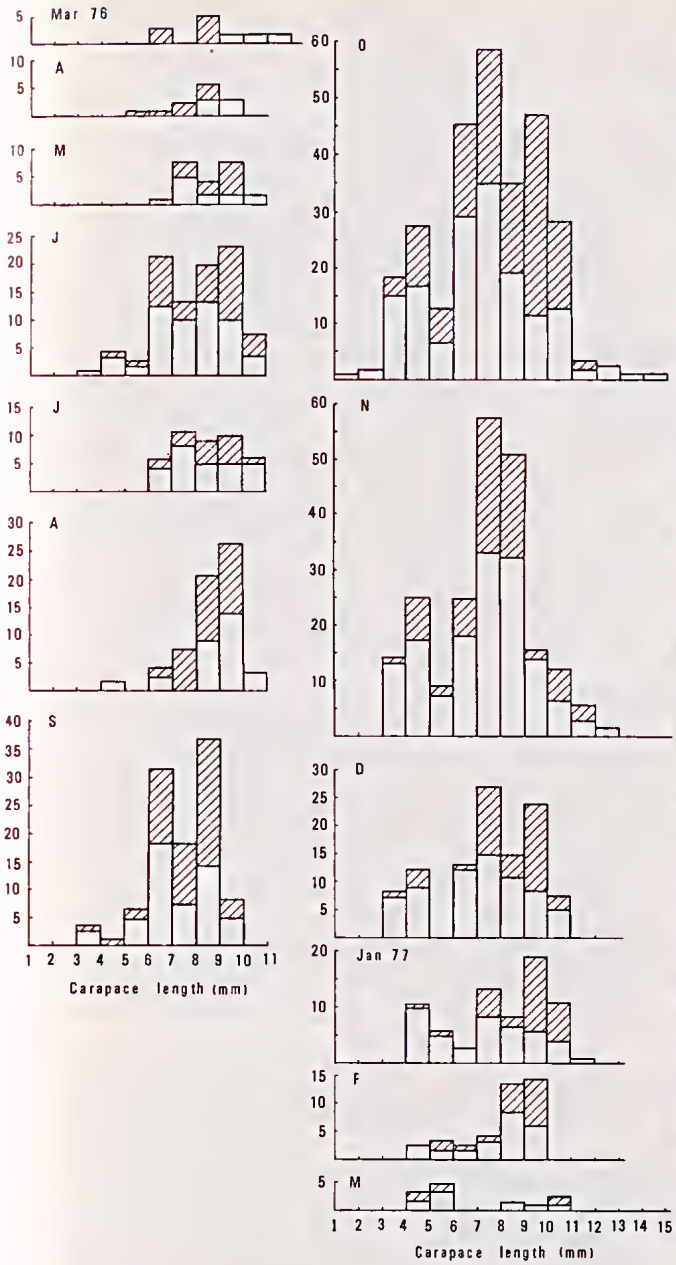

FIG. 5.— Size frequency histograms for *Callianassa australiensis* collected monthly from March 1976 to March 1977. Bar height indicates total individuals/m²; cross hatching indicates the number of females and the clear area number of males.

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